CHILTON'S

AUTOMOTIVE INDUSTRIES

NOVEMBER 1988

SINCE 1908

1988 DIE CHANGE CHALLENGE

THE BEST DIE CHANGE TEAM IN AMERICA

NOVEMBER 1988 VOLUME 168, No.11

CHILTON'S AUTOMOTIVE INDUSTRIES SINCE 1895

For the third year in a row, AI pits the industry's best stamping plants against each other – and against our stopwatches – in the annual Die Change Challenge. As the number of participants increases, so does their QDC efficiency. Story begins on p.52.

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AUTOMOTIVE INDUSTRIES (ISSN 0273-656x) magazine is published monthly by Chilton Co., Chilton Way, Radnor, PA 19089. Chilton Company is a division of Capital Cities/ABC, Inc., New York, NY. Subscription rates: 1 yr. $39.95 US, $79.95 foreign. Phone (215) 964-4152. Second Class Postage paid at Wayne, PA 19087 and additional mailing offices. POSTMASTER: Send address changes to AUTOMOTIVE INDUSTRIES, Circulation Dept., Chilton Way, Radnor, PA 19089. © Chilton Company, 1988. Permission to photocopy for internal use or the internal use of specific clients is granted by Chilton Company for libraries and other users registered with the Copyright Clearance Center (CCC), provided that a base fee of $1.00 per copy of the article, plus 25¢ per page is paid to the CCC, 21 Congress St., Salem, MA 01970. Address special requests to The Editor. (0273-656x/85 $1.00 + 25¢)

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DIE CHANGE CHALLENGE '88

Our search for the Best Die Change Team shows that competition improves the industry.

By JOHN McELROY

There's a man standing at the end of a noisy line of stamping presses. In one hand the man has a stopwatch, in the other a bullhorn. As a stamped steel door panel appears on the conveyor that's moving towards him, he keeps his eyes glued to the stopwatch and raises the bullhorn to his lips.

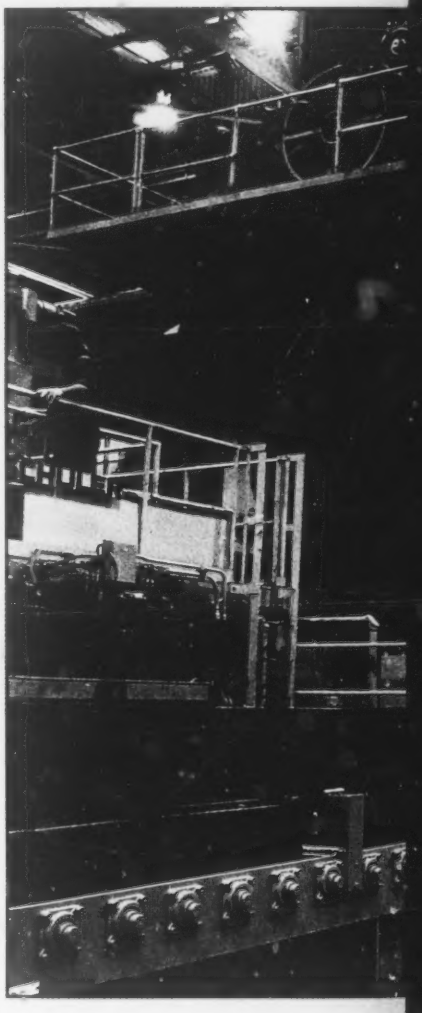
"Fifty-five, fifty-six, fifty-seven," he calls out over the constant *ka-chunk, ka-chunk, ka-chunk* of the press line at GM's Grand Blanc, MI stamping plant. The crowd of workers surging around him are totally absorbed by the excitement of the moment. Jostling for a better view of the panel coming down the conveyor, a spontaneous chant goes up: "Go, go, *go*!"

As the panel emerges from the last press, the man with the bullhorn clicks his watch to a stop. "4:59!" he yells. Pandemonium breaks out – fists are thrust elatedly into the air. High-fives slap at every open hand. One worker runs through the plant, bellowing "Awwwwriiiight!"

No wonder they're elated. They've just changed the dies on this line of stamping presses in less than five minutes. A year ago it would've taken them 12 hours. And no, they haven't installed robots or computers or automation to make this incredible improvement. They did it the old fashioned way, with organization and teamwork.

Not only have these "Rust Belt" union workers proved to themselves that they can be world-class, they're making their plant competitive again, and in the process they've probably saved their jobs.

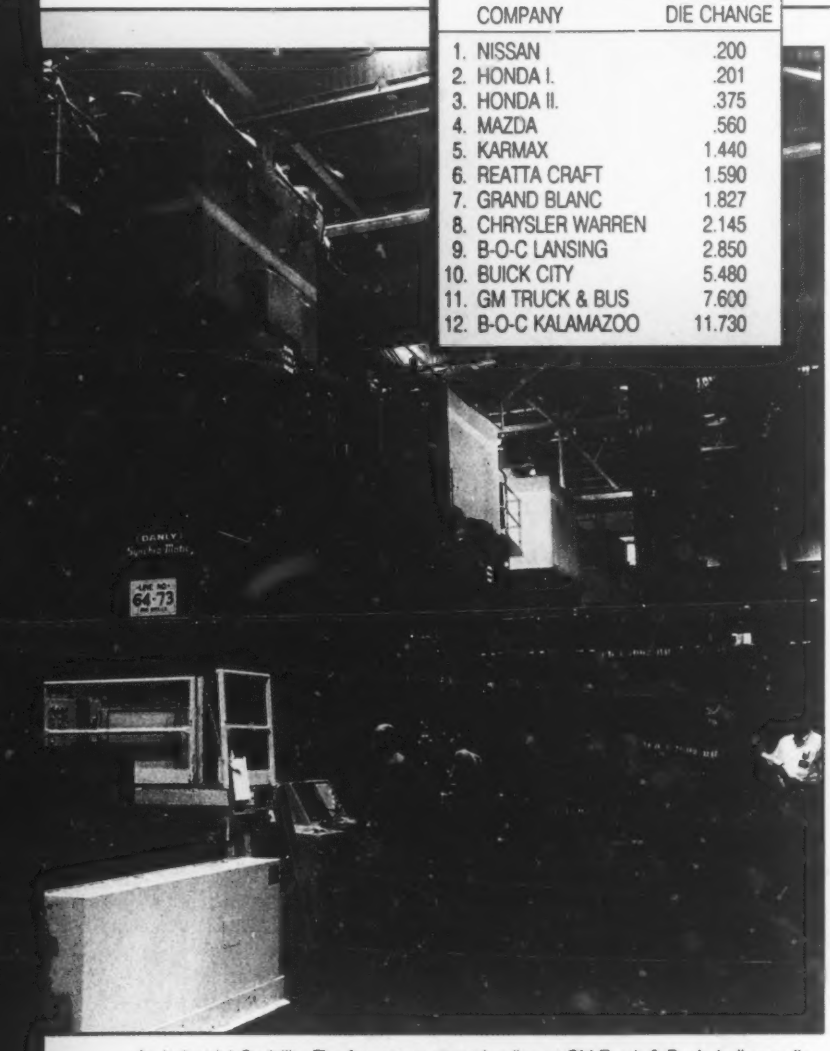
"It was by doing all the simple things and by using a little team work that we got all this accomplished," notes Jerry Leman, Grand Blanc's plant manager. "The bottom line is people working together."



The Die Change Challenge

Three years ago we at *AI* recognized that some truly spectacular improvements were starting to take place in the American automotive industry, especially on the factory floor. Not only did we want to bring attention to what was happening, we wanted to help accelerate this change. And what better way to make people compete than to organize a competitive event? Ergo,

COMPANY	MAN-HOURS/ DIE CHANGE
1. NISSAN	.200
2. HONDA I.	.201
3. HONDA II.	.375
4. MAZDA	.560
5. KARMAX	1.440
6. REATTA CRAFT	1.590
7. GRAND BLANC	1.827
8. CHRYSLER WARREN	2.145
9. B-O-C LANSING	2.850
10. BUICK CITY	5.480
11. GM TRUCK & BUS	7.600
12. B-O-C KALAMAZOO	11.730



An industrial Godzilla: The four-press stamping line at GM Truck & Bus's Indianapolis plant.

the Die Change Challenge.

We invited every automaker with operations in the US – including the Japanese – to take part. But in 1986, only four plants took up the challenge. That didn't surprise us; we recognized that quick die change (QDC) was still in the development phase in the US.

But sure enough, last year two more plants competed and this year the field increased to 12 QDC teams.

But these teams are very much the exceptions to the rule. In the US automotive industry, a typical die change – which involves taking the dies that are making, let's say doors, and changing them with dies that will make, say fenders – still takes anywhere from six to 10 *hours*. In Japan a typical die change takes five to 10 *minutes*.

This astounding difference documents one of the many areas where Japanese automakers still hold a competitive advantage over their American counterparts. But recently the American auto industry has awakened to the advantage QDC offers.

"We calculated that every minute saved on a die change, spread over a year's time, will save us about $25,000," says Tom Dull, supervisor of manufacturing at GM's Truck & Bus plant in Indianapolis.

Changing Dies The Old Way

It's not that the Big Three have been totally in the dark. It's just that traditionally, there wasn't a pressing need for quick die changes.

For one thing, the American automakers used to make fewer kinds of cars than they do today. In the old days, when Chevy changed dies to make different parts (which was rare), it always did so on the midnight shift and took up to eight hours to do so. But with the proliferation of models that exists today, no one can afford that many press lines.

In Japan, a different set of circumstances led the automakers there to develop a different manufacturing philosophy. In the '50s, Japan was still struggling to get back on its feet, and investment capital was hard to come by. The Japanese car companies literally couldn't afford to buy extra press lines (which now cost $15 million) and dedicate them to make specific parts. They needed the flexibility to make many parts on each press line, and quick die change gave them that flexibility. In addition, it also allowed them to make smaller lot sizes which fit into their just-in-time production system that operates with lower inventory.

It was only at the beginning of the 1980s that the US automotive industry began to discover just how far it had fallen behind the Japanese. A 1981 manufacturing comparison conducted by Harbour & Associates for the DOT sent shock waves through the industry. It showed the Japanese with a $1750 cost advantage for a subcompact car!

Many American auto executives scoffed in disbelief at such reports. But

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they couldn't ignore the fact that millions of consumers clearly perceived Japanese cars were better. Something had to be done.

Slowly, things began to happen. At first, however, the Big Three tried to buy their way out of their problem. Efforts in the early 1980s centered on "high-tech" solutions such as robots, computers and other automation. But after several new plants sputtered to a stop when their new technology failed, it became apparent that this approach alone wouldn't work.

"If they couldn't efficiently manage yesterday's technology, what made them think they could manage tomorrow's?" asks manufacturing consultant Jim Harbour.

Worker Input

The problem required a more basic approach. Now more effort was put into re-designing cars and components for greater ease of assembly. The entire manufacturing process was statistically analyzed to make sure it was capable of making quality parts. And, most importantly, the first genuine efforts were made to bring the hourly workforce into the planning process.

It's this last point that made quick die changes possible. A die change is a tightly choreographed performance, an industrial ballet. It involves moving dies that can weigh anywhere from 20,000 to 70,000 lb each, and moving them in and out of a press line in minutes. It calls for precision and perfection. A minute's delay means wasting thousands of dollars in lost production. Without the co-operation of the hourly workforce, QDC is impossible.

"The reason for our success came from two nice four-letter words: team work. It just shows what happens when everyone works together, because if you blinked, you missed it," notes Bill Smith, launch coordinator at Chrysler's Warren Stamping plant.

The ABC's Of QDC

A traditional die change is like having your car serviced at the local garage. By comparison, a quick die change is like making a pit stop in the Daytona 500. At the garage they'll try to figure out what's wrong with your car and maybe they'll have it fixed in a few days. But at Daytona, the pit crew has all its tools and parts right there and everyone in the crew knows exactly what to do: get the car back in the race as fast as possible. The same applies to changing stamping dies.

"When a press is sitting idle it's not making any parts. When it's not making any parts, we're not making any money," explains Mike Hottinger, a VP with Magna, the Canadian automotive supplier. Interestingly, Magna calculated that just by cutting a die change from three hours to one hour it could free up 1000 hours of extra production time. In fact, one of its plants increased sales by $4 million simply through the extra production time achieved from its QDC efforts. And Magna didn't spend a dime in new equipment for these improvements.

Though there's no doubt that new

QUICK DIE CHANGE VS. SLOW DIE CHANGE

1. Production stops
2. Rams come down
3. Clamps come off dies
4. Rams go up
5. Bolsters slide out of presses
6. New bolsters slide in
7. Rams come down
8. Clamps go on dies
9. Automation changed (if needed)
10. Production resumes
11. Overhead crane takes dies to storage

TOTAL TIME: 5-10 MINS.

1. Production stops
2. Rams come down
3. Workers look for wrenches
4. Clamps come off dies
5. Rams go up
6. Bolsters slide out
7. Overhead crane takes die to storage
8. Break time: 10 min.
9. Die spotter looks for new dies in die storage room
10. Overhead crane brings new dies to the press line
11. Die setters start bolting dies to the bolsters
12. Lunch time: 30 min.
13. Bolsters slide into press
14. Ram height adjusted for new die
15. Workers look for other wrenches
16. Clamps go on dies
17. Automation is changed
18. 3-4 panels run through draw die; if not OK, call die repairmen
19. Break time: 10 min.
20. Run more panels, adjust dies and automation accordingly
21. Production resumes

TOTAL TIME: 6-10 HOURS

"A year ago this would've taken all day."—Ron Sumners, GM Truck & Bus.

GM Truck & Bus: Fully-automatic but a 30:40 QDC time.

GM TRUCK AND BUS Indianapolis, IN
CATEGORY: Fully-automated
NO. OF PRESSES: 5
MAKE OF PRESSES: Danly
TYPE OF PRESS: 800-, 600-ton tandems
AGE OF PRESS LINE: 9 yrs.
TYPE OF PANEL: Chev./GMC truck doors
STEEL MAKE: Bethlehem
QDC TEAM: 15 people
UNION: UAW Local 23

press lines are wonderful to have, it's possible to achieve world-class times with old equipment as well, even though it takes more people to do so. The key is to convert as much of the operation as possible to *external* set-up, so that the QDC team can be getting ready even while the press runs.

With external set-up, all the new dies are pre-staged next to the press. If wrenches are needed, they too are set at the ready. And the same goes for the automatic extractors that pull the stamped steel panels from the presses.

Once everything is in place and ready to go, the line is stopped, and the workers start to "break down" the first press in the press line. Everyone has a specific job to do, and once the first press is changed, they move to the second one, and so on down the line. Obviously, teamwork is crucial.

"We'd practice a die set [change], come back in the meeting room, talk it over, find where we could do better. We worked on each person's movements and who was going to be where. Then we'd go out and do it all over again," explains Tom Posch, department manager of stamping at Nissan. "Brainstorming produced 90% of the improvements; physical changes only accounted for 10%."

DIE CHANGE TIME COMPARISON
The faster the die change, the more productive a plant can be.

Fully Automated		
	COMPANY	TIME
1.	NISSAN	1:20
2.	MAZDA	5:40
3.	HONDA I.	6:03
4.	B-O-C LANSING	3:34
5.	GM TRUCK & BUS	30:40
Semi Automated		
	COMPANY	TIME
1.	HONDA II.	3:57
2.	REATTA CRAFT	9:33
3.	KARMAX (MAGNA)	9:39
4.	B-O-C BUICK CITY	18:16
Manual		
	COMPANY	TIME
1.	CHRYSLER WARREN	4:57
2.	GRAND BLANC	4:59
3.	B-O-C KALAMAZOO	32:00

The Rules

The Die Change Challenge takes the *AI* editorial staff on an 8000-mile whirlwind tour of the American Midwest, plus a two-day jaunt into Canada. It is a three week cram course in stamping operations that fills several notebooks and cassette tapes. And the process is punctuated by a blur of crowded airports, day-long rental car drives, and lots of coffee.

There are three QDC categories. Fully-automated presses are completely computer-controlled. The dies slide in on rolling bolsters and are clamped automatically. Semi-automated presses may have rolling bolsters and automatic clamps, but not both. And manual presses are just that – no automatic anything.

The way we time each die change goes like this: We start our stopwatches when the last panel comes out of the last press, and we stop them after the dies have been changed and the first good panel comes through.

But time alone doesn't dictate which team is the best. Manpower, cost and productivity is also factored in. And though we see who does the best in each category, we're still after the *overall* best.

Before we give the final results away, let's take a look at how each team performed.

Chrysler – Warren

Why is everyone at Chrysler's Warren Stamping smiling? We haven't started and already they're happy. This looks like it's going to be fun.

As we approach the press line, the mystery begins to unfold. Compared to those of some of the monster presses we've seen at other competitors, this line is positively dainty. Warren, a first-year entry in our QDC Challenge, has made the rules of the competition work in their favor. The Dodge van front fender they'll be stamping *is* an exterior body panel and it *is* a class A surface – the kind the customer can

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see and touch. Nobody said anything about size. Good thinking, Chrysler.

The troops are pumped. As the last panel moves through the presses, the operators pull aside the metal tables that are used to transfer parts from press to press. Suddenly, in a blur of motion, five forklifts draft each other down the aisle. When they reach the press line, they peel off in a manner reminiscent of the Blue Angels.

By the time the trucks reach the presses, the diesetters have loosened all the necessary hardware. The forklifts pull the dies from the press and in the only altercation of the day, two of them trade paint. Undaunted, the crowd behind us begins shouting words of encouragement as the trucks rush off for the new dies.

Only 2:00 have passed and the replacements are on their way. These guys are *smokin'*. While the trucks position the dies, we see clenched fists in the air. "*Come on!*" someone barks. One by one the forklifts dissappear and the operators shove the metal tables back into place. Here comes the first piece...4:57!

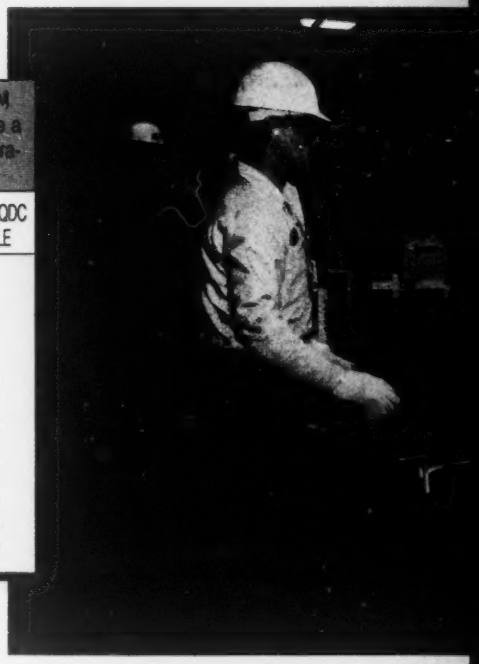
The floor becomes a zoo of hugging, celebrating, handshakes and high-fives. People are jumping up and down like a scene out of *Rocky*. In an attempt to get pictures, we're caught up in a wave of people.

"We're a family," beams one of the workers. "We might fight amongst each other, but we work together."

During our brief Q & A session that follows the die change, Bill Smith, launch coordinator states: "We developed techniques here that are going to help all of Chrysler stamping. We brought in 48 jobs (parts) in 18 months because of our run-to-run program." Quotes like that are music to our ears. That's what QDC is all about.—*Gerry Kobe*

MANPOWER COMPARISON
The fewer the people needed to make a die change, the more efficient the operation is.

	COMPANY	NO. OF QDC PEOPLE
1.	HONDA I.	2
2.	MAZDA	6
3. (tie)	KARMAX	9
	NISSAN	9
5. (tie)	REATTA	10
	HONDA II.	10
7.	GM TRUCK & BUS	15
8.	BUICK CITY	18
9.	LANSING	20
10. (tie)	KALAMAZOO	22
	GRAND BLANC	22
12.	CHRYSLER WARREN	26



GM Truck & Bus—Indy

As we're driving down I-69 into Indianapolis, the radio reports are assessing the effect of the drought on soybean prices and pork-belly futures. It would have been a good year, but the unexpected happened. The drought hit. But as the farmers know, when the unexpected hits, you just deal with it. The same goes for die changes. As we peer down one of these massive stamping lines at GM's Truck & Bus plant in Indianapolis, we get the feeling we're looking at a monstrous mechanical spider. And a noisy one at that. The rams all drop at once—*ka-chunk*—then lift up. The automatic arms reach in, pull out the panels, then stop. The rams come down again and the operation repeats.

But then the last panel spits out of the last press and everything stops. The die change is underway. Everyone works quietly and deliberately. At 2:00, the rolling bolsters are coming out, and the new ones are right behind them. As each new bolster comes into position, one man walks over to a control panel and starts pushing buttons and twisting knobs. He eases the ram into place, and when it's right where he wants it, he flips a few more switches. The dies are clamped into place.

At 5:00 everything is ready to go. But *no*—there's a problem! We're watching a control panel that is flashing a red light. An electrician comes over and hits a button. Some green lights come on. But the red light keeps flashing. He hits the button a few more times, but no luck.

No one panics or gets mad. But you can see the disappointment on their faces. They all look up at the overhead panel with the flashing red light and wait. Finally, it goes green. Somewhere amongst the wires, a plug had not been pushed in. The spider starts to work again: *Ka-chunk, ka-chunk*.

The inspector grabs the first panel as it comes off the line. It's good! But this die change took 30:00. They had hoped for 10:00.

Yet, they keep it all in perspective. "If you have been here a year ago this would've taken *all day*," says Ron Sumners, a press metalworker.—*John McElroy*

Karmax—Magna

We're thrilled when we find that Karmax has decided to enter the competition, because being on the outskirts of Toronto, it adds an international flavor to the Die Change Challenge. This is the first supplier to take part, but that doesn't surprise us. Karmax is part of the giant Canadian supplier, Magna, which is well known in the industry for many firsts.

The Karmax facility is an impressive new stamping plant that is kept spotlessly clean. The floor shines. The presses look like they're freshly painted. The dies are immaculate. The automation is pre-staged in neat rows. And unlike most new plants, there are a lot of windows in the plant.

"We don't want people coming into work thinking, 'Oh, I'm going in that black hole again,'" says Russ Peddle, the project manager.

Out on the floor there is an air of nervousness. When the signal for the die change comes through these guys really start to scurry. If we had to title this die change we'd call it "High Anxiety." No one is doing anything foolish – they just desperately want to do well.

And they've borrowed a concept from racing. Just as you might see a pit stop where the crew chief stands in front of the car until the stop is completed, then throws both hands in the air and steps back to signal the driver to get back in the race, the same idea is used here.

One guy in a red shirt moves up the line with the QDC team. As each press is "buttoned up" he throws his hands in the air, signaling the crew to move onto the next press. When his hands go up, the crew responds: "Go!" To the next press: "Go!" And so on up the line.

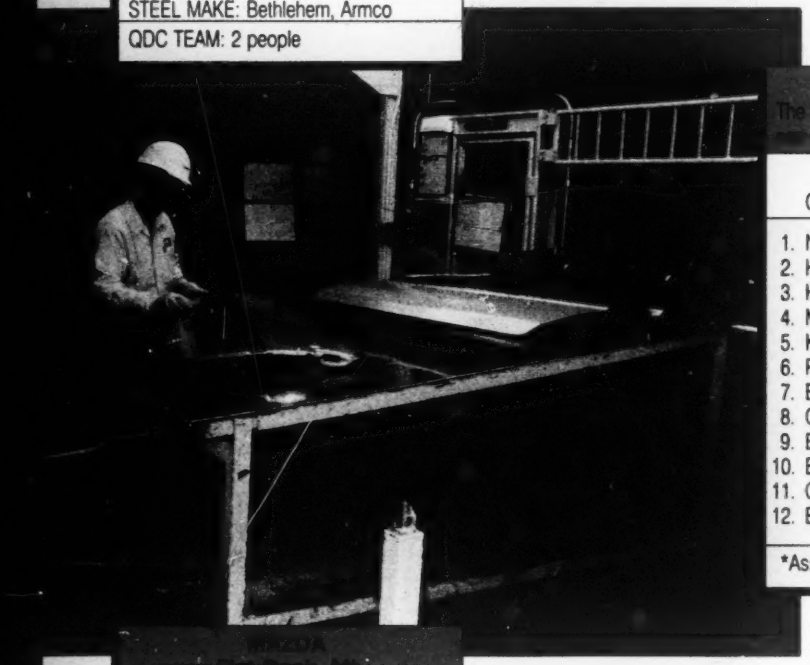
At 8:00, the first panel comes through the draw press. Several people follow the panel as it moves up the line, imploring it to move faster. "Come on, *come on*," they say. The panels certainly seem to move fast and the first one comes off in 9:39. It's a good time and the team is obviously happy.

Everyone on the die change team wears a gray shirt with their name on one side and a patch that says 20/20 on the other. The patch represents their goal to achieve a 20:00 die change average in the plant. So much for setting your goals too low.

"Maybe now we'll have to switch that to 10/10," jokes one worker. – *John McElroy*

HONDA
Marysville, OH

CATEGORY: Fully-automated
NO. OF PRESSES: 1
MAKE OF PRESS: Hitachi-Zosen
TYPE OF PRESS: 4700-ton transfer
AGE OF PRESS: 1 yr.
TYPE OF PANELS: Civic doors
STEEL MAKE: Bethlehem, Armco
QDC TEAM: 2 people



COST COMPARISON
The ultimate test of competitiveness is to see who can deliver at the lowest cost.

	COMPANY	LABOR COST/ DIE CHANGE*
1.	NISSAN	$ 5.40
2.	HONDA I.	$ 5.42
3.	HONDA II.	$ 10.12
4.	MAZDA	$ 15.12
5.	KARMAX (MAGNA)	$ 39.00
6.	REATTA	$ 42.97
7.	B-O-C GRAND BLANC	$ 49.33
8.	CHRYSLER WARREN	$ 57.91
9.	B-O-C LANSING	$ 77.09
10.	BUICK CITY	$147.96
11.	GM TRUCK & BUS	$207.00
12.	B-O-C KALAMAZOO	$316.80

*Assumes a $27.00/hr. hourly wage.

Mazda: Newcomer does a fully-automatic 5:40.

MAZDA
Flat Rock, MI

CATEGORY: Fully-automated
NO. OF PRESSES: 1 (5 dies)
MAKE OF PRESS: Komatsu
TYPE OF PRESS: 3000-ton tri-ax transfer
AGE OF PRESS LINE: 2 yrs.
TYPE OF PANEL: Ford Probe door
STEEL MAKE: Nippon
QDC TEAM: 6 people
UNION: UAW Local 3000

Nissan – Smyrna

At first glance, Nissan Smyrna doesn't seem like a stamping plant.

Entering the lobby of the building is like passing through the air lock of a space vehicle. Circular, sleek, and ceilingless. Are we really in a manufacturing plant?

Then, *boom*! Huge double doors give way to the underworld – towering presses, uniformed plant workers, and the ever-present din of manufacturing. Nissan plantmen slowly join our walk to the press line. Above us hangs

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a blue and white banner: *The Best Die Change Team in America, 1987.*

These men are ready to defend the title they won in last year's competition. But they're not overconfident. In fact, says Tom Posch, department manager of stamping, Nissan held its own qualifying round between the night and day shifts. The day shift won – by :04!

And that team, which we are about to see in action, came in the previous Saturday and practiced for three hours – on company time.

The Nissan team quietly takes their places at the huge tandem line. The change they'll make is from Sentra left-hand front fenders to right-hand front fenders.

Go! Before we know it, the press springs into action. *Chunk. Clang. Whirr. Bang.* There is no cheering, no grunting, just intense concentration from the team. The men at the front of the press are breaking down the line before the first panel is half-way through. No second chances.

By the time the last left-hand panel is out of the press, three of the bolsters are unseated with new dies coming in right behind them.

Chunk. Clang. There are no smiles on Nissan team's faces. The onlookers are equally intense. At :49, every bolster is out and the first new fender is primed to enter the last press.

Chunk. The last press takes the panel into its cavernous jaws. *Clang.* It's stamped. *Whirr.* The press spits the panel out. *Bang.* It's good! 1:20!

The time is announced. You'd expect pandemonium – but Smyrna's QDC team doesn't jump, shout, or slap backs. Instead, they just smile and exchange quick glances. Why no euphoria? "We beat *that* time in practice the other day," says one team member. Onlookers are equally subdued, with one saying, "If anyone beats that, I want to know about it."

Buddy, nobody did.

– Cathy Coffman

Buick City – Flint

This is a welcome change of scenery: on-site stamping. To our way of thinking, when the team gets to see the panels whisked off by conveyor to the body shop, it helps to underscore the importance of QDC.

During our pre-change briefing, we learn that as little as two months ago, the average die change took six hours. One month ago it took two to three hours. Now they've got it whittled down to less than one. If that sounds impressive, chart it. It looks awesome. Another unusual tidbit is that we'll be seeing quarter panels in today's die change. Generally, teams tend to shy away from quarters because they are relatively complex panels.

By the time we actually get out to the line, the team is in place and ready for action. And while there are 18 people involved in this die change, the seven huge presses present themselves to be formidable opponents. The last panel is nearing the lone, hand-fed gap press at the end of the line. Stop watches are up – we're off!

No automatic clamps on these beauties; just raw manpower and King Kong wrenches. Actually, while we're standing here weighing the pros and cons of a bit more automation, it's amazing how quickly these guys manage to get the dies loose. Before we know it, the die carts are in motion. All except one; the problem is quickly diagnosed as a loose connection, and the cart begins to move with only seconds lost.

All is going smoothly but that little glitch did not go unnoticed by the guy with the clipboard who's taking notes. "We check the time it takes to remove and replace the automation, and then any recurring problem we mark on this chart," he says. "And then this gets entered into the computer. Then [pointing] Butch here will make up charts that will show us where the delays are."

At the 10:00 mark, all the new dies are in place and the big wrenches are making the last few turns. All goes well and at 11:00, the first panel goes into the draw die. A quick inspection verifies that the drawn panel is good and it begins its slow journey through the remaining presses. When it arrives at the end of the line, the worker who feeds the gap press gives it the once-over-lightly quality check by hand. The clock stops – 18:16. The panel's good.

Now we get to watch the workers strut, especially the guy who just won the pool for being closest to the actual QDC time. This is also the best clocking yet for this press line. The workers know it, and it is reflected in their words: "Things aren't going so bad here. If some other people out there don't improve, we might just end up taking their jobs."

When you consider what these guys have done with 20+ year old equipment, it wouldn't surprise us a bit.

– Gerry Kobe

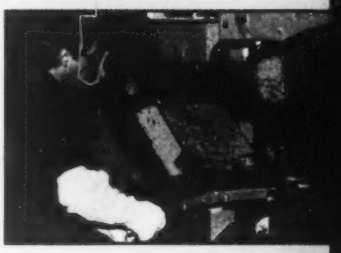
Mazda – Flat Rock

Well, well, well. It comes as something of a surprise, but Mazda's Flat Rock plant has entered the Die Change Challenge – a surprise because the plant is so new that it couldn't have even competed last year if it wanted. From that standpoint the Mazda workers are "green." But as soon as they step into action, it's obvious that they work like seasoned veterans.

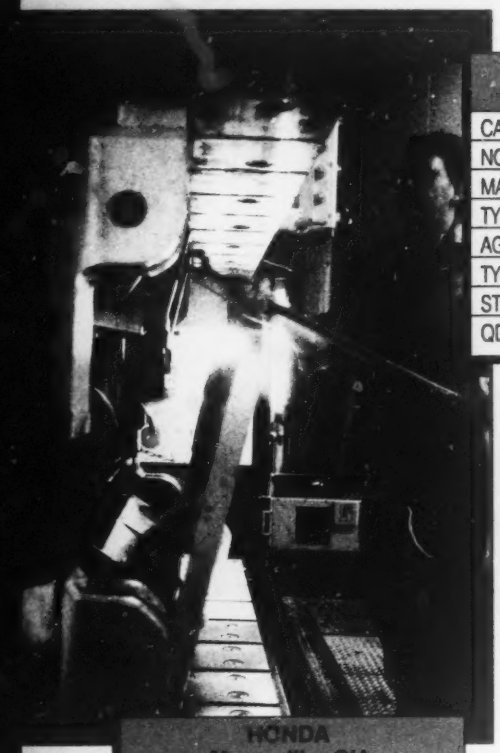
As the last panel comes off the line, we start our stopwatch and the QDC team starts to break down the line. No one is in a rush and the equipment is

CHRYSLER
Warren, MI

CATEGORY: Manual
NO. OF PRESSES: 6
MAKE OF PRESS: USI, Verson, Niagra
TYPE OF PRESS: 250-ton tandem gap
AGE OF PRESS LINE: 30 yrs.
TYPE OF PANEL: Dodge van front fenders
STEEL MAKE: Nippon
QDC TEAM: 26 people
UNION: UAW Local 869



Chrysler Warren: 4:57 on a manual line (above). Magna's Karmax: Canada's super supplier does a 9:39 (right).



KARMAX (MAGNA) Milton, Ontario
CATEGORY: Semi-automated
NO. OF PRESSES: 6
MAKE OF PRESS: Mueller Weingarten
TYPE OF PRESS: Tandems
AGE OF PRESS: 1 yr.
TYPE OF PANELS: Chrys. Premier doors
STEEL MAKE: Nippon
QDC TEAM: 9 people

"We developed techniques here that will help all of Chrysler stamping."—Bill Smith, Chrysler Warren.

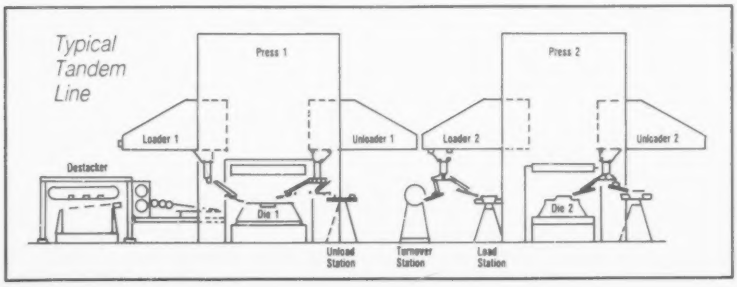
HONDA Marysville, OH
CATEGORY: Semi-automated
NO. OF PRESSES: 3
MAKE OF PRESS: Danly
TYPE OF PRESS: tandem
AGE OF PRESS: 6 yrs.
TYPE OF PANELS: Accord floor, Civic hoods
STEEL MAKE: Inland
QDC TEAM: 10 people

under total computer control. The transfer bars disconnect and unclamp. The ram of the press comes down. The die clamps run out. The ram raises. The safety doors go up, and the bolsters slide from one side to the other in unison—they're very close together so as not to waste time.

Then bottom clamps automatically close, the scrap doors rise up and the safety doors come down. Five minutes later the press is ready to run. Forty seconds later the first panel comes off the line. These people are rookies?

Because of their proficiency, Mazda's QDC team makes about three or four die changes per shift, on each press line. Presently, the press shop makes enough panels, about 1800 per run, to keep about 2½ days ahead of the body shop, but the goal is to cut that down to only three shifts. That means QDC has to be a way of life.

"I used to w n a traditional-type stamping plan made up to 20,000 parts per rur had a problem it would be at least three weeks before the fix would come through. That's why we need quick die changes to make small-lot runs," explains Ray Hedding, Flat Rock's manager of stamping.—*John McElroy*



B-O-C Kalamazoo

The warm glow of the wood-paneled meeting room creates a perfect backdrop to discuss QDC strategy. Faces of plant manager Steve Pettiford and attending UAW representatives are relaxed, their eyes welcoming. We speak effortlessly as the quiet envelope created by the walls makes even a smile seem audible. But then, something happens: As we enter the plant, lips draw tight with a determined tension, eyes go blank and cold. The silence we had enjoyed only moments earlier fades with each step. By the time we reach the press line, the air has become a torrent of mechanical pounding. The men become machines.

The die change begins. The last panel is still moving down the line and the team is already breaking down the first press. That relaxed look of confidence seen in the meeting room is now worn by every team member.

There are no rolling bolsters, no automatic clamps. We are witnessing a "man's" die change where muscle, sweat and experience move glaciers of steel with uncanny precision.

An overhead crane moves into place. As the operator puts slack in the chains, the crew systematically wraps the links around the die. An almost psychic communication seems to occur as the crane operator "knows" the precise moment to lift. As the crane moves back, the die is dragged out of the press and onto the skids. The crew adjusts the chains for a better lifting position and in seconds, a 50,000 lb die is whisked smoothly away.

By now, the work has followed the first panel to the end of the line and all of the presses are in various stages of changeover. The new die is approaching the first press and the crane opera-

DIE CHANGE CHALLENGE '88

tor startles us as he uses a swinging motion to set the die further into the opening. With precious few inches to spare, the operator scores a bullseye on every attempt. The crane is then moved to the other side, to drag the die through the press and into position. Methodically, the process is repeated for all four presses.

Smiles begin to appear on the faces of the crew as the final bolts are being tightened on the last press. In the distance, the warning siren of the crane grows less distinct as it carries the dies off to storage. At that moment, the presses come back to life and the first panel begins moving toward a sea of eyes. When the panel drops, a half dozen stopwatches click in unison – 32:00.

The look of calm is back in Pettiford's eyes. "It was all done with ideas that came from the team, not from management telling them from on high down what to do..." His conversation is cut short by his team calling him over for a group photo. That's teamwork! – *Gerry Kobe*

Reatta – Lansing

Want to feel out of place? Walk into the Reatta Craft Centre. It's so different that it makes you feel like you're in one of those "what's wrong with this picture" photos. Much too clean in here to be a "real" stamping facility – no oil to slide around in, no derelict presses sitting around. And why aren't zillions of little bolts and washers embedded in the floor? This ain't right.

Look at that single press line. It looks brand new, and unlike any we've seen.

The only thing "wrong" in this picture is us. To be sure, the cleanliness and organization of this facility are no accident. The workers here are absolutely barrel-chested with pride over this line. Those "new" presses we're looking at are actually the oldest of any we'll see in this year's QDC Challenge. In fact, the presses were salvaged from other GM operations and completely reconditioned for the Craft Centre.

It's showtime! Curiously, the mood is not one of apprehension. Without regard for our cameras, the die change team positions themselves around the presses and watches in perceived indifference as the last panel begins moving through the line.

The change is on, but there is no pseudo-frantic scramble for our benefit. The team of 10 moves purposefully from press to press, working in unison, never at odds. In keeping with the overall "mood" of the die change, the presses are equipped with die carts that move at a steady, deliberate (if not debilitating) pace. Judging from the scuttlebutt, we expect to see next year's carts exhibit a bit more speed.

At 4:00, the die carts are pulling back from the presses and the new dies are being clamped into place. The men work very methodically and smoothly, giving the impression that they can do this day-in, day-out.

Eight minutes have now elapsed and the first blank goes into the presses. Seconds later the metal comes out "ugly" and for a split second twenty eyebrows raise simultaneously. Fortunately, the second blank comes out a "keeper" and makes its way through two more presses, to a 9:33 QDC time.

"With all the parts we've got to run, we have to make at least one die change per shift. We have only one line, and we run all the parts through it," said one team member. We later learned that "all the parts" meant 18 different panels using 73 different dies. All this from one line!

On the way out we made a side trip through the "green room" which plays havoc with your color perception. You might even say that we left Reatta seeing with a "different set of eyes." How appropriate. – *Gerry Kobe*

B-O-C Lansing North

The Quick Die Change at Lansing North has turned into a bit more of a social event than we might have guessed. And while we'll admit that it's interesting, it does seem that as we make our way to the plant's meeting room, there is an inordinate number of non-die change types lurking about.

"I think they're from the magazine," confides one woman to another. "Tourists," is the reply. Oh-oh, sounds hostile. We quicken our pace.

Once in the meeting room we settle in for a thumbnail sketch from plant manager Mike Camp. Because this plant is a return QDC competitor, Camp's outline of the plant's progress is of particular interest to *AI*. "True jointness is increasing," he says. "We're finding that we can tackle even tougher problems now." As our discussion continues, we learn that one year ago, uptime in the plant was 58%. Today, uptime is around 68% and the improvements in die changes are getting the credit.

CATEGORY: Semi-automated
NO. OF PRESSES: 7
MAKE OF PRESS: Danly
TYPE OF PRESS: Tandem
AGE OF PRESS: 22 yrs.
TYPE OF PANELS: Buick LeSabre ¼ panels
STEEL MAKE: LTV
QDC TEAM: 18 people
UNION: UAW Local 599

"It was all done with ideas from the team, not from management." – Steve Pettiford, B-O-C Kalamazoo.

Camp suggests we go to the press line because the die change is ready to begin. As the team goes to work, their method causes us to draw an interesting comparison to racing. You've probably heard it said that the guy who is going the fastest on the track generally doesn't *look* like he's fast. That's because he's so smooth that he makes it look easy. Well, guess what? These guys are getting into the presses and automation faster than last year, but they make it look easy.

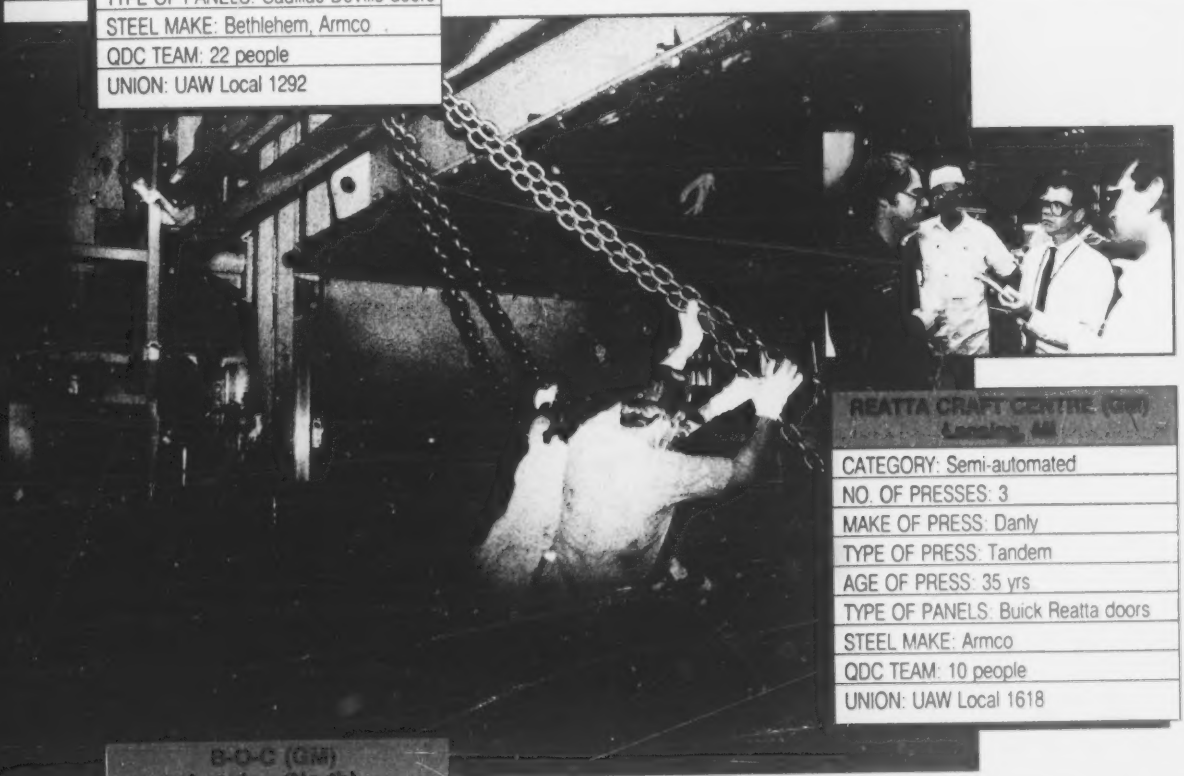
The pick-and-place hardware has been color-coded and equipped with quick-disconnect clamps to streamline the operation. In less than 4:00, all the

B-O-C (GM) Grand Blanc, MI
CATEGORY: Manual
NO. OF PRESSES: 5
MAKE OF PRESS: Danly
TYPE OF PRESS: Tandem
AGE OF PRESS: 31 yrs.
TYPE OF PANELS: Cadillac DeVille doors
STEEL MAKE: Bethlehem, Armco
QDC TEAM: 22 people
UNION: UAW Local 1292

it's up and running it takes about 3:00 for the panel to run the gauntlet.

At 8:00 the panel is entering the last press and the sizable crowd begins polite applause. The volume of their approval slowly grows until, at 8:34, the first panel stops the clocks. The dark aisles are momentarily alive with feeling that in this plant, yesterday's best work is not good enough for today.

Marysville has four stamping lines. The semi-automated tandem press team won our inaugural QDC Challenge in 1986, with the fast time of 5:14. Last year, they dropped that to



REATTA CRAFT CENTRE (GM) Lansing, MI
CATEGORY: Semi-automated
NO. OF PRESSES: 3
MAKE OF PRESS: Danly
TYPE OF PRESS: Tandem
AGE OF PRESS: 35 yrs
TYPE OF PANELS: Buick Reatta doors
STEEL MAKE: Armco
QDC TEAM: 10 people
UNION: UAW Local 1618

B-O-C (GM) Lansing (North)
CATEGORY: Fully-automated
NO. OF PRESSES: 7
MAKE OF PRESS: Danly
TYPE OF PRESS: Tandem
AGE OF PRESS: 20 yrs.
TYPE OF PANELS: Pontiac Grand Am fenders
STEEL MAKE: Inland
QDC TEAM: 20 people
UNION: UAW Local 652

bolsters have stopped moving and the first panel is on its way. The team has performed brilliantly, but by nature the line works against their efforts. This is a seven-press line with two stations between the presses. Even when

B-O-C Kalamazoo: Ballet-like precision on a manual line. 32.00

voiced approval, but quickly return to a mix of handshakes and congratulatory chatter. The team has proved their point. Their time is over 1:00 faster than last year.

–Doug Willams

Honda – Marysville

As our "Die Change Tour '88" caravan rolls into Honda's Marysville, OH complex before dawn, caffeine and pre-QDC adrenaline have us anxious. But so does just being here. Each time we visit Marysville, we're hit with the 4:38, again the top semi-auto squad.

For the second year in a row, Honda will be showing us die changes on two press lines – the B-line of three tandem presses (Honda II in the charts) and the fully-automatic transfer press on D-line (Honda I). The latter is a 4700-ton colossus, one of the three largest stamping presses in the world. The big press has been running 12 strokes a minute, and we're amazed that the people at the end of the line can keep up. But they hold a plant record for production – 4731 parts per eight-hour shift.

After a pre-QDC pep talk in the stamping shop, the D-line QDC team

DIE CHANGE CHALLENGE '88

of three gets ready. Only two people regularly run this die set, but I've been given the honorary nod to start the automation. As the Hitachi monster pounds out its last left-side Civic door panel, there's a brief countdown, then "*Hit it!*" I punch a large red button; the die change begins.

For the next 6:03, there's not much to do but behold the computer mastering the beast. Within the Hitachi's steel belly, transfer mechanisms are cleared away. Safety gates on the opposite side of the press rise and the left-side dies roll out on adjacent bolsters, while the right-side door panel dies roll in on our side. This all happens three times a shift here.

When it's over and the first new panel is deemed 'good', this QDC has taken :22 longer than last year's. No one seems concerned.

A few minutes later we're over on B-line. Last year the QDC team on this three-press line swapped dies in a blazing 4:38. This year's team of 10 once did five die sets in a day, and they casually claim that sub-5:00 changes are now the norm. We'll see.

Go! The safety gates are barely up as the team assaults the trio of presses, swarming into them as the Accord floorpan dies exit one side. The semi-automatic presses require some manual attention inside – jigs and handling arms are set up, the tops of the dies have to be banged down and everything is adjusted. Before we know it, the gates are going down and a steel blank is heading for the Civic hood dies now in place. *Bang!*

The fresh hood panel is OK'd. Our stopwatches click at the 3:57 mark, a B-line record. Everybody's happy, but they soon go back to business. That's the way it is at Marysville, where this year's quickest die change becomes next year's routine. – *Lindsay Brooke*

Cadillac – Grand Blanc

Grand Blanc (pronounced Grand Blank) is the last stop on our QDC tour. As we enter the plant, we notice some photos of Sherman tanks that serve as clues to the age of this facility. Sherman tanks? Indeed. This plant built Shermans during WW II and Patton tanks for the Korean War.

But between the photos and the aging wooden floors, we begin to get the idea that as far as the QDC Challenge is concerned, the plant may have bitten off more than it can chew.

We walk past the silent ruins of presses that retired long ago and wonder what lies ahead. Do these guys know what they're up against? Do they know how good the competition really is? When we reach the meeting room, we're stunned to learn that the plans to participate in our Challenge are only two months old. As details unfold, they tell of the battle to reduce die change times from 12 hours in early 1986 to 8.5 hours a year later.

"Two weeks ago," we're told, "we were down to four hours."

We try to get a feel for what to expect by asking for predictions on today's die change.

"No predictions," comes the cool reply. "Let's just go out and give it our best effort."

It's a spunky answer but considering that we're dealing with wrenches and die trucks, it's going to have to be a hell of a best effort.

We approach a line of ancient-looking presses, but are thrown off-guard by what we see. Gathered around the press line, there is a pumped-up, fire-breathing crew of wildmen, all wearing bright mustard-colored T-shirts with the Cadillac emblem and "Grand Blanc" on the front. They're already slapping each other on the back as the last panel comes down the line, but their eyes stay riveted to the presses.

The panel drops. A whistle blows. The aisles erupt in a wash of action. We've been duped! Not only is this team fast, they also have better choreography than the June Taylor Dancers. As yellow shirts dart in and out of the presses, the whistle continues to blow signaling the team to break down the next press. They are literally going too fast to photograph.

The concentration involved in this die change is unreal. Everywhere you look you see people scrambling to help one another and keep the change safe. As the die trucks pull back, there is a "Red Sea" effect among the workers that insures a clear path. Inside the presses, we see workers doing two jobs at once – one hand tightens the die, the other hand clears a chain – unreal!

So much has happened so fast, that it's hard to believe that after only 2:32 the first panel is starting down the line. A man with a bull horn is starting to count down the seconds as the panel approaches the last press. As we move down the line alongside the panel, we realize that we are walking toward an enormous crowd that has picked up the countdown from the bullhorn.

CATEGORY: Manual
NO. OF PRESSES: 4
MAKE OF PRESS: Danly
TYPE OF PRESSES: Tandem
AGE OF PRESSES: 20 yrs.
TYPE OF PANEL: Olds/Buick doors
STEEL MAKE: Bethlehem
QDC TEAM: 22 people
UNION: UAW Local 488

"Go, go, *go*" – 4:50, 4:51, 4:52 – "Come on!" – 4:55 – "We're gonna do it" – 4:58...PANDEMONIUM.

The stopwatches stop at 4:59 and the crowd is absolutely alive with energy. This old plant is in its glory.

We work our way back to the meeting room with the die change team in tow. Behind us the crowd is burned by the heat of the moment and continues to celebrate. When we get to the room we are presented with "Grand Blanc" T-shirts which somehow seem to be the appropriate dress. Once in uniform, we wade through the crowd in time to hear some great commentary: "Jerry," says one of the workers to the plant manager, "if you want us to do it in under 3:00, you've got to give us more than one week to practice!"

NISSAN Smyrna, TN
CATEGORY: Fully-automated
NO. OF PRESSES: 5
MAKE OF PRESS: Hitachi-Zosen
TYPE OF PRESSES: Tandem line
AGE OF PRESS LINE: 5 yrs.
TYPE OF PANELS: Sentra fenders STEEL MAKE: Mitsui
QDC TEAM: 9 people

Similar sentiments are expressed by several team members. "Nothing's impossible," boasts a voice. The mood is definitely up; QDC has worked its magic.—*Gerry Kobe*

The Envelope Please

It's time to for the results—as if you hadn't already peeked at the charts! But the raw numbers don't tell the whole story, because they can't capture the emotion of the event.

If we had to pick the most exciting die change team in action, we'd have to call it a tie between Chrysler's Warren Stamping plant and GM's Grand Blanc operations. Their elation was contagious.

If there was an award for the most dramatic team in action, then the men at GM's Kalamazoo plant get the gold for their awesome performance.

For consistency and constant improvement, the people at GM's Lansing operations have shown that as long as *AI* wants to keep coming back, they'll keep getting better.

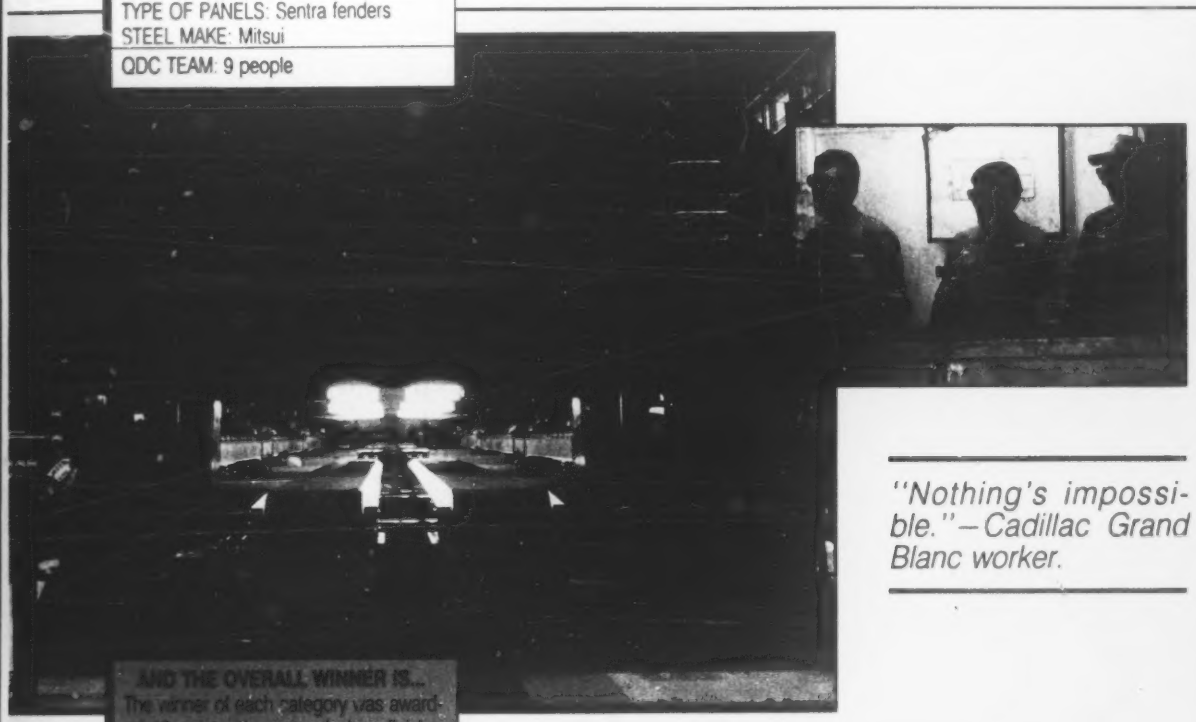
And the QDC teams at Honda have shown that they are—hands down—the most professional in the business.

In the final analysis, there are fond memories and excitement that we're going to keep from every plant we visited.

But the best of the bunch, for the second year in a row, is the QDC team from Nissan. They are simply so quick, you have to wonder how they can improve their time next year.

Next year! Suddenly our thoughts turn to how we're going to handle Die Change Challenge '89. What if more plants want to compete? Do we have the budget and time to cover it? After all, just trying to cover the teams that entered this year tied up the *AI* staff for weeks. We bounce ideas around...maybe we should have an entry fee, or maybe we should have a qualifying time...

We've come to the conclusion that if so many QDC teams can figure out how to organize themselves into world-class competitors, then you can be sure that *Automotive Industries* will be there to tell the story. AI



"Nothing's impossible."—Cadillac Grand Blanc worker.

AND THE OVERALL WINNER IS...

The winner of each category was awarded 12 points, the second place finisher 11, etc. By adding up the points in each category, we were able to determine the overall placing of each plant.

1. NISSAN
2. HONDA I.
3. HONDA II.
4. MAZDA
5. KARMAX (MAGNA)
6. REATTA CRAFT CENTRE
7. B-O-C GRAND BLANC
8. CHRYSLER WARREN
9. B-O-C LANSING (North)
10. B-O-C BUICK CITY
11. GM TRUCK & BUS
12. B-O-C KALAMAZOO

AUTOMAKER QUARTERLY REPORT

Transplants battle domestics for the third quarter market.

by DR. THOMAS O'GRADY

We hear much discussion about the domestics being strong this year, but we also see foreign cars moving higher on the top 10 list. Third quarter transplant sales accounted for 9.1% of total car sales.

Through new products and improvements in quality, Ford and Chrysler gained market share during the third quarter. GM still suffers from a poorer image and slow product development, losing 1.1 percentage points of industry share during the quarter. GM needs to improve its selling rate during the fourth quarter to avoid further losses in share.

There are major shifts in market share by geographic base so far this year. Japanese share for the quarter fell from 21.4% to 20.9% and the Europeans suffered an even bigger loss. Meanwhile, share of the industry's "other imports" (which should add cars from Taiwan and Malaysia during '89) grew to 4.9%.

Dr. Thomas O'Grady heads Integrated Automotive Resources, Inc. in Wayne, PA.

Most foreign manufacturers lost share in the third quarter. Toyota and Honda are still doing very well, but Nissan's weak product line resulted in a third choice position. Isuzu and several of the European companies (notably Volvo, Porsche, and Yugo) still show severe signs of weakness.

The Ford Escort, responding to heavy incentives, returned to the top spot for the quarter, while Honda's Ohio-built Accord moved ahead of Corsica/Beretta to become the first foreign nameplate in the No. 2 position.

Each of the Big Three increased their its third quarter light truck shares. Greater acceptance of the Chevrolet pickups – which outsold Ford's full-size pickups during August – was partially responsible for raising GM's share from 32.6% to 35.0% this quarter. Meanwhile, most imported pickups continue to suffer from higher prices and image problems. AI

WHAT'S HOT! US Auto Sales (3rd Quarter Results)

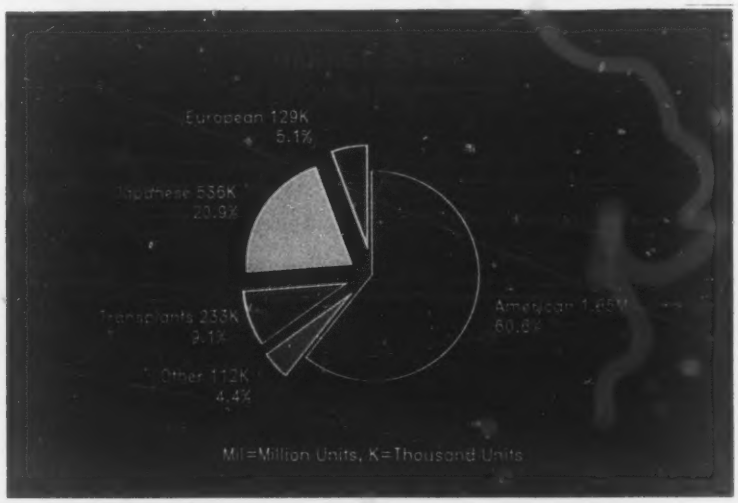
Carline	'88	'87	% Change
Escort	102,539	114,048	(10.09%)
Accord*	90,849	87,084	4.32%
Corsica/ Beretta	84,913	89,272	(4.88%)
Sentra	77,764	61,014	27.45%
Taurus	75,944	99,581	(23.74%)
Cavalier	73,560	68,769	6.97%
Tempo	69,608	45,339	53.53%
Clera	67,742	70,049	(3.29%)
Excel	60,473	78,421	(22.89%)
Camry	59,906	53,252	12.50%

*– Includes imports
( ) – Negative value

US Passenger Car Market Shares 3rd Qtr '88

Manufacturer	Sales	% Total
General Motors	2,941,295	36.38%
Ford	1,751,138	21.66%
Chrysler	919,124	11.37%
Honda/Acura	564,036	6.96%
Toyota	493,078	6.88%
Nissan	367,099	4.53%
Hyundai	208,966	2.58%
Mazda	197,449	2.43%
VW/Audi	152,869	1.87%
Subaru	116,429	1.44%
TOTAL	7,711,483	

(Continued p.84)



Passenger Car Market Share By Geographic Base

Third Quarter 1988

Manufacturers	Total Sales	Total Market Share
American	1,555,894	60.64%
Japanese	536,182	20.90%
European	129,507	5.05%
Transplants (VW, Honda, NUMMI, Nissan, Mazda/Ford)	232,623	9.07%
Other Imports (Excel, Festiva, Fox, LeMans, Precis)	111,644	4.35%
Total	**2,565,850**	**100.00%**

THIRD QUARTER DOMESTIC LIGHT TRUCK PRODUCTION

COMPANY	FULL-SIZE TRUCKS	COMPACT TRUCKS	FULL-SIZE VANS	COMPACT VANS	FULL-SIZE SPORTS UTILITY	COMPACT SPORTS UTILITY	TOTAL 1988	TOTAL 1987
FORD	133,572	67,983	50,052	46,029	9048	25,370	332,054	309,319
CHEVROLET	128,531	80,303	37,127	43,954	29,497*	31,870	351,282	309,983
GMC	44,393	16,528	12,168	11,142	8498	13,421	106,150	96,434
CHRYSLER	20,781	20,849	24,195	100,846	5115	--	171,786	149,646
JEEP	--	9683	--	--	2313	55,429	67,425	60,604
NISSAN	--	14,969	--	--	--	--	14,969	23,975

*Includes Suburban and P-model